



# *Charging Forward*

Renewable Energy Education  
amidst the COVID-19 epidemic  
Friday May 15, 2020

Kenneth Walz, Madison College  
James Auld, NextEra Energy  
Kevin Cooper, Indian River State College

# CreateEnergy.org



*Center For Renewable Energy  
Advanced Technological Education*

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## Publications

### CREATE Webinars

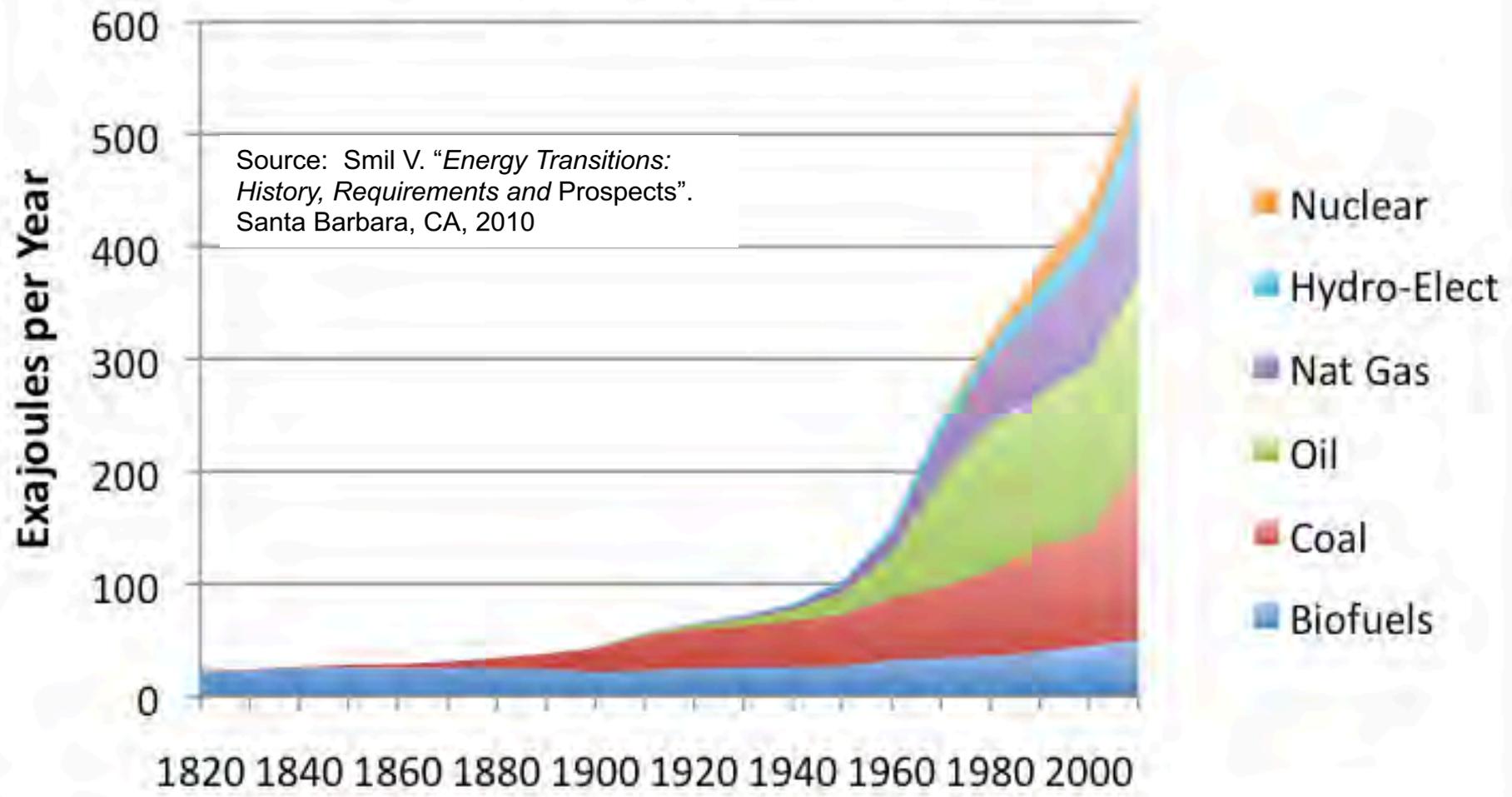
- Career Mapping A Powerful Tool, 05/01/20 - [Webinar](#) | [Presentation Slides](#)
- How Solar Became Cheap, 04/24/20 - [Webinar](#)
- The Solar Schools of the Future, Today, 02/24/20 - [Webinar](#) | [Presentation Slides](#)
- Solar PV: Battery Storage and Charge Controller, 01/10/20 - [Webinar](#) | [Presentation Slides](#)
- Battery Storage, 12/06/19 - [Webinar](#) | [Presentation Slides](#)
- Solar Training Network, 11/16/18 - [Webinar](#) | [Presentation Slides](#)
- NABCEP New Specialty Certifications, 04/27/18 - [Webinar](#) | [Presentation Slides](#)
- Solar Training & Hiring Insights, 12/01/17 - [Webinar](#) | [Presentation Slides](#)
- Clean Energy Jobs, 05/12/17 - [Webinar](#) | [Presentation Slides](#)

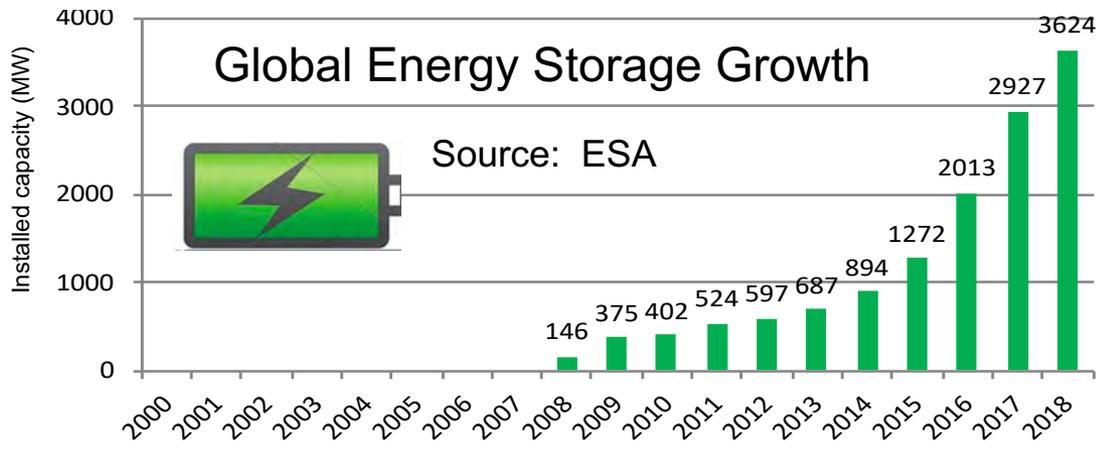
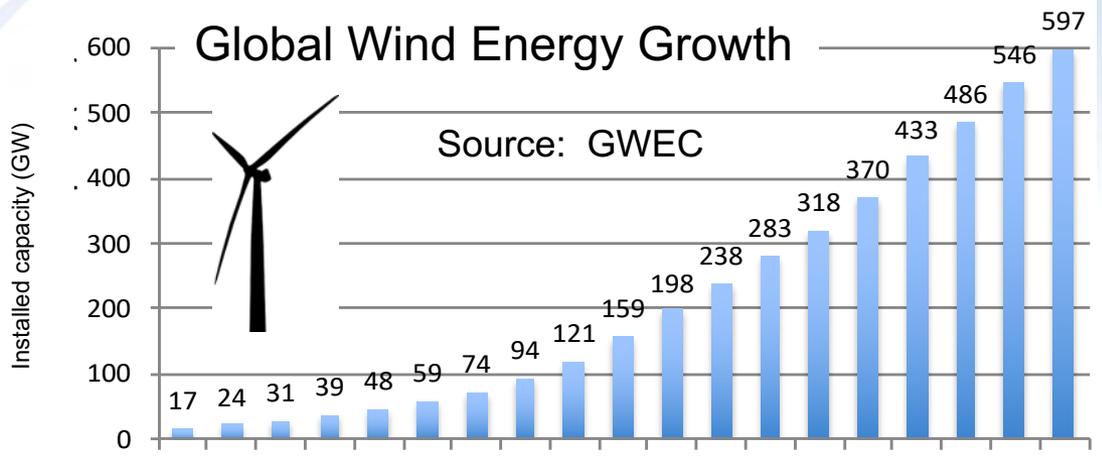
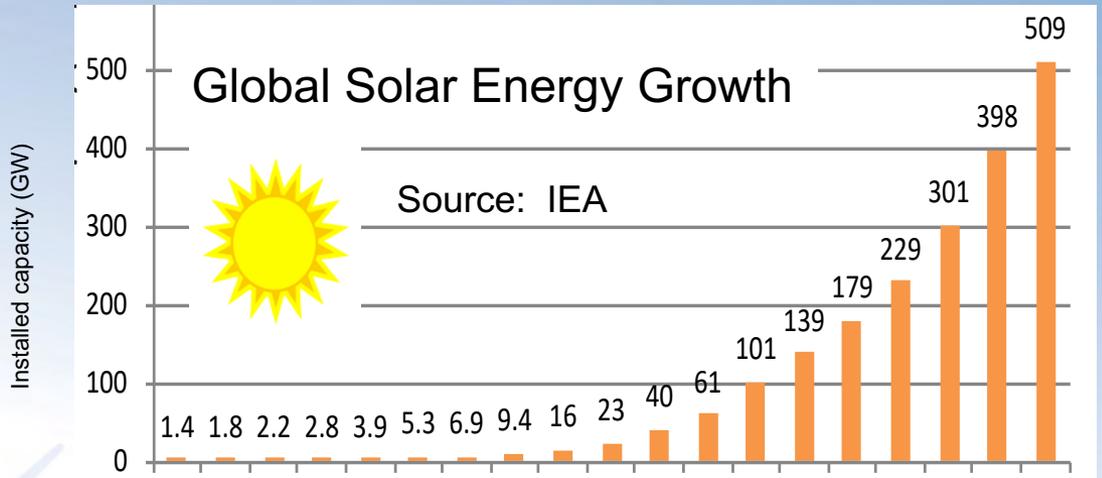
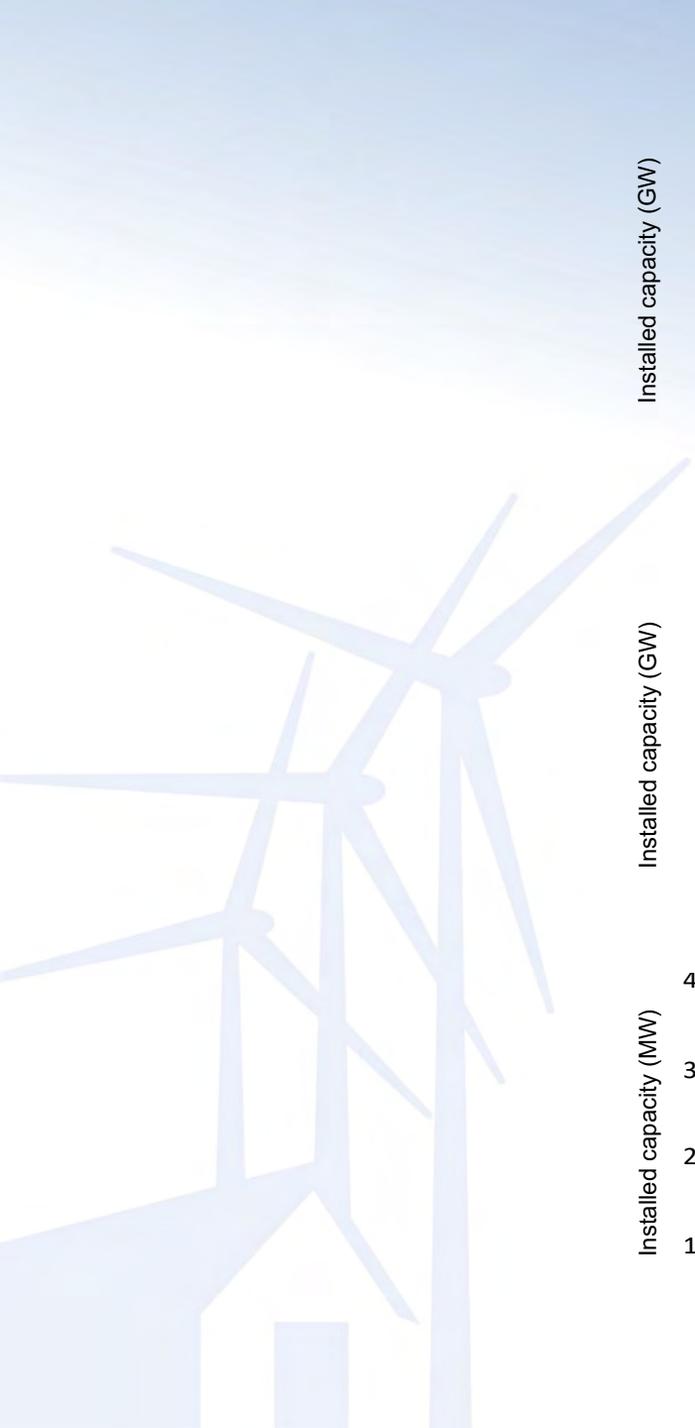
# Let's Examine Some Trends in the Energy Sector



# We live at a historic time...

## World Energy Consumption





# Renewable energy costs hit new lows, now cheapest new power option for most of the world

Phil Dzikiy - May. 29th 2019 2:54 pm ET [t](#) @phildzikiy





# Solar PV Systems Commissioned 2002 2.1 and 1.2 kW



**MADISON**  
AREA | TECHNICAL  
**COLLEGE**



**MADISON**  
AREA | TECHNICAL  
**COLLEGE**

# Solar PV System Commissioned 2019 1,850 kW

- 5,700 Solar Modules
- 2,850 DC Power Optimizers
- 53 DC to AC inverters
- Real Time Power Monitoring
- Remote SCADA controls system
- Rapid Shutdown Safety System



# THIS WISCONSIN CITY JUST COMMITTED TO 100% RENEWABLE ENERGY

Posted by [Aaron Nelson](#) | Mar 27, 2017 | ★★★★★



Other early cities that made the pledge included Burlington, Vermont; Aspen, Colorado; the California cities of San Diego, San Francisco and San Jose; Rochester, Minnesota; St. Petersburg, Florida; Grand Rapids, Michigan; Greensburg, Kansas; and Georgetown, Texas. The list has since grown to over 130 cities. Eight states have also passed similar legislation.

# OCCUPATIONAL OUTLOOK HANDBOOK

Occupational Outlook Handbook >

## Fastest Growing Occupations



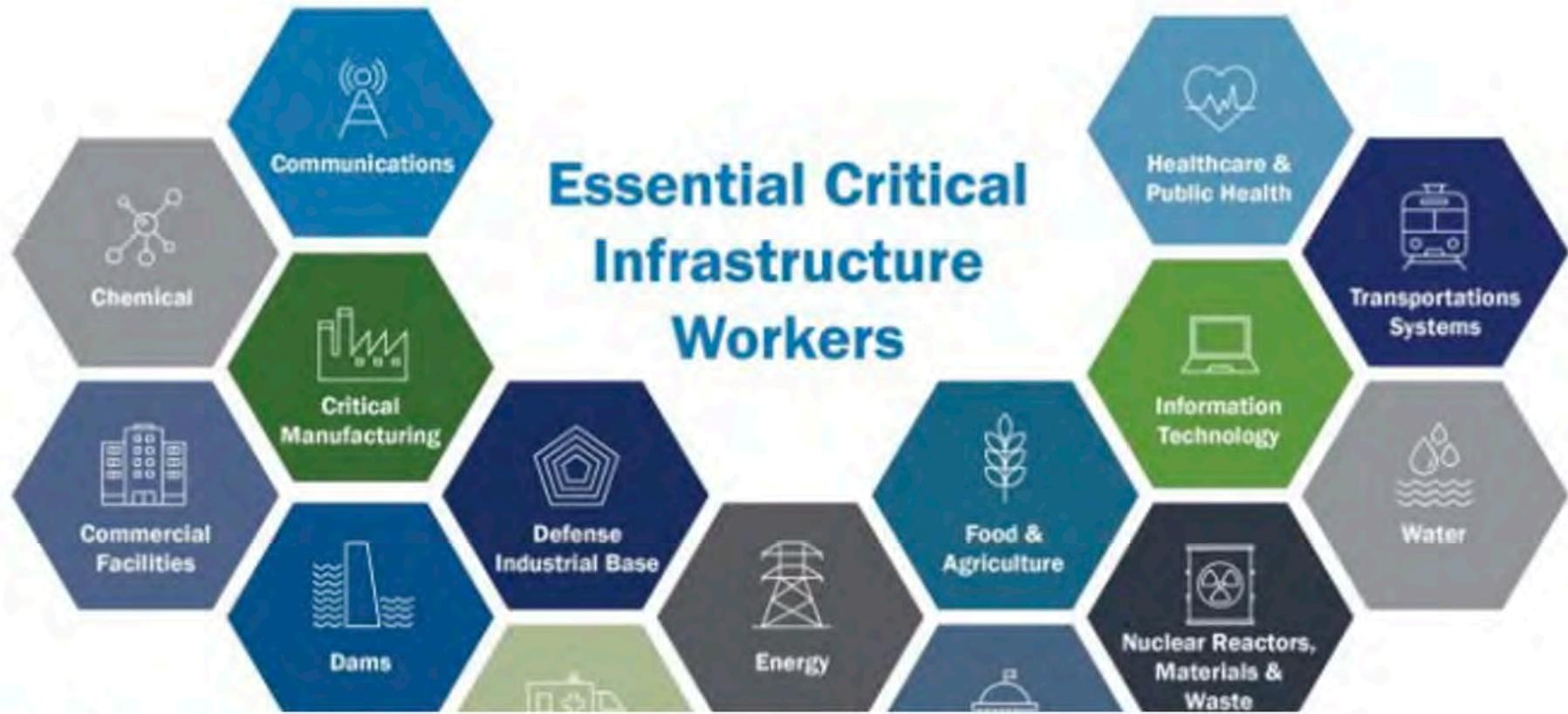
**Fastest growing occupations:** 20 occupations with the highest percent change of employment between 2018-28.

*Click on an occupation name to see the full occupational profile.*

OCCUPATION	GROWTH RATE, 2018-28	2018 MEDIAN PAY
<a href="#">Solar photovoltaic installers</a>	63%	\$42,680 per year
<a href="#">Wind turbine service technicians</a>	57%	\$54,370 per year
<a href="#">Home health aides</a>	37%	\$24,200 per year
<a href="#">Personal care aides</a>	36%	\$24,020 per year
<a href="#">Occupational therapy assistants</a>	33%	\$60,220 per year

### Clean Energy Jobs:

- 1) *Pay a family supporting wage*
- 2) *Cannot be outsourced*
- 3) *Cannot be done by robots*
- 4) *Benefit society*



**ELECTRIC UTILITY OPERATIONS**

# CISA Identifies Critical Workers Amidst COVID-19 Pandemic



**CISA**  
CYBER+INFRASTRUCTURE

## Report estimates over half a million clean energy jobs will be lost through Q2 without policy interventions

By Kelsey Misbrener | April 15, 2020



More than 106,000 clean energy workers lost their jobs in the month of March, and hundreds of thousands more clean energy job losses are projected in the coming months, according to [a new analysis of unemployment data](#) released today by E2 (Environmental Entrepreneurs), the American Council on Renewable Energy (ACORE), E4TheFuture and BW Research Partnership.

The analysis of Department of Labor data found that 106,472 workers in clean energy occupations filed for unemployment benefits last month, wiping out all 2019 clean energy job gains across renewable energy, energy efficiency, clean vehicles, energy storage and clean fuels. These include electricians, HVAC and mechanical trades technicians and construction workers who work in energy efficiency; solar installers; wind industry engineers and technicians; and manufacturing workers employed by electric and other clean- vehicle manufacturing companies and suppliers.

[Bioenergy](#), [Energy Efficiency](#), [Geothermal](#), [Hydropower](#), [News](#),  
[Solar](#), [Storage](#), [Wind Power](#)

# Clean energy job losses mount as COVID-19's economic toll continues

4.15.20

**BRIEF**

## COVID-19 hits clean energy jobs, but storage companies could be 'bucking the trend'



EFA

# CLEAN JOBS AMERICA 2020

REPOWERING AMERICA'S ECONOMY IN THE WAKE OF COVID-19



# Clean Energy Needs STEM Professionals!

- Engineers (Civil, Mechanical, Electrical, Environmental, Geological)
- Electrical Technicians
- Architects and Construction Technicians
- Project Managers
- Energy Analysts

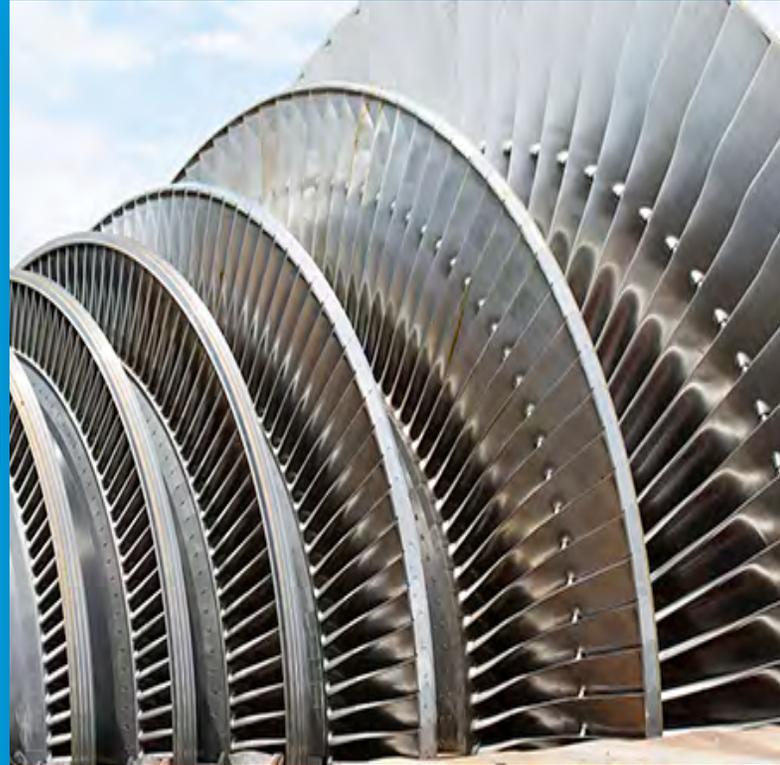
**Thank you for  
your attention!**

***Questions?***





# NextEra Energy Solving America's Energy Challenges



# Our company

- ▶ Renewable energy leader

world's  
#1

generator of wind  
and solar energy  
2018



# We're an industry leader that's creating jobs, generating economic benefits and investing in infrastructure across America



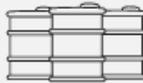
Top 20

In the world for innovation,  
according to Fortune



\$50-55 billion

Planned investments in  
American infrastructure  
through 2022



98%

Reduction in our  
dependency on foreign oil  
since 2001



45,500

Megawatts of net generating  
capacity



945%

Total shareholder return  
over the last 15 years



Thousands

High-paying American jobs  
created through our  
investments

# The Challenge

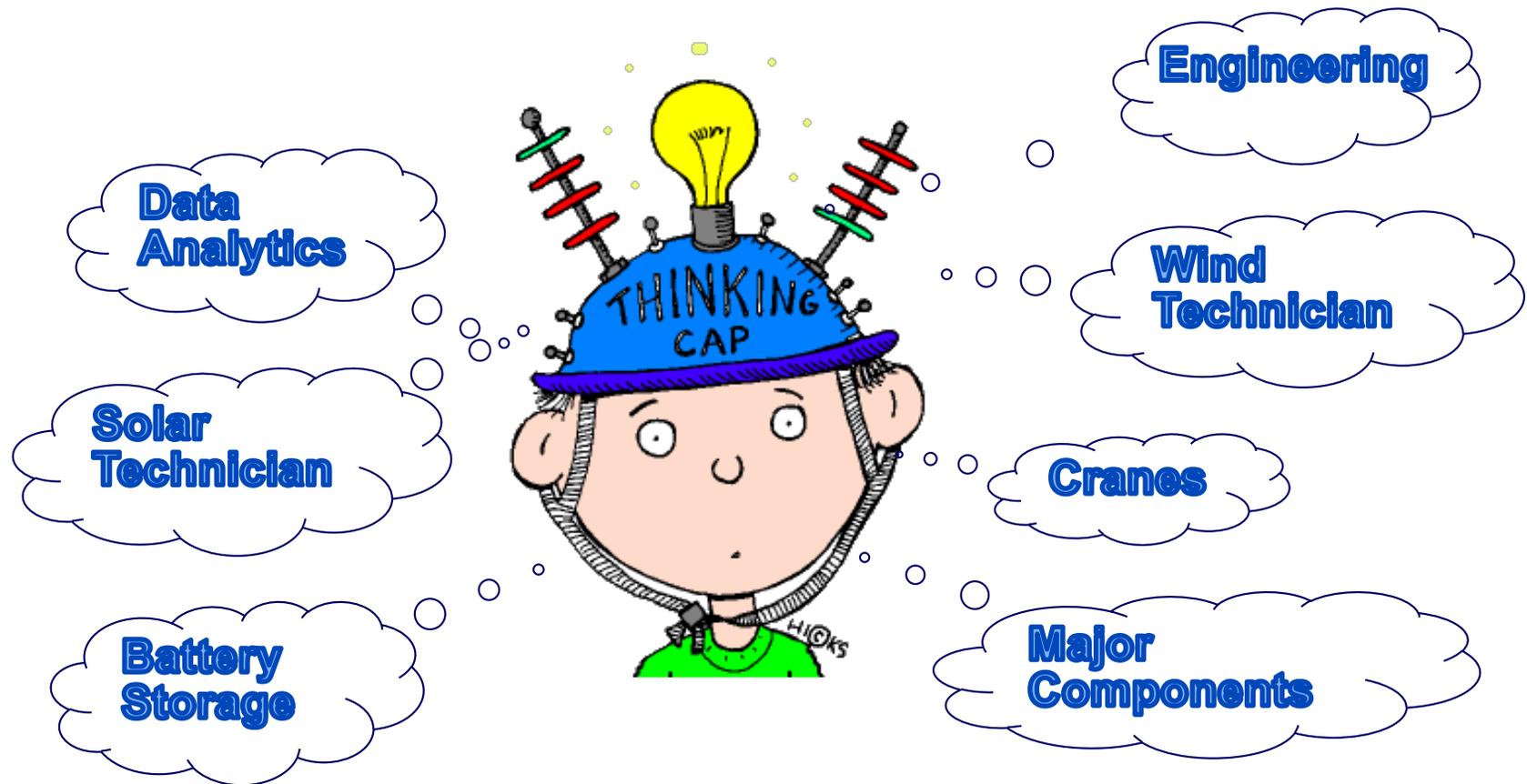
**Where will we find the next generation of energy professionals?**

**Solution: Establish robust talent pipelines by systematically collaborating with educational institutions to:**

- ▶ Focus on engineering, skilled craft and technical training
- ▶ Support advisory boards
- ▶ Promote experiential learning – internships, senior projects, special projects and capstones
- ▶ Identify common learning objectives
- ▶ Advance technology
- ▶ Develop career paths for displaced workers

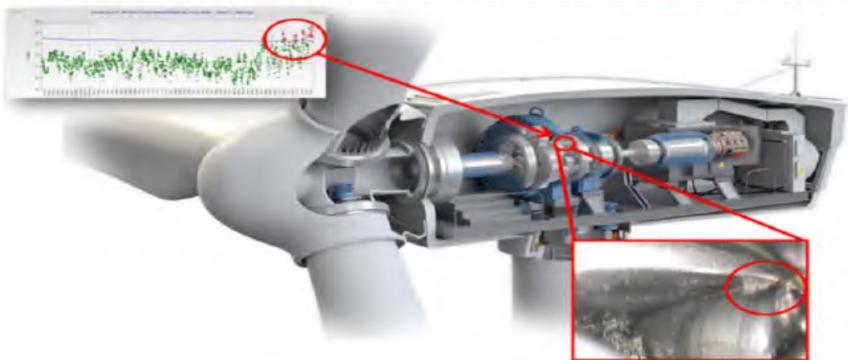
**•Working together to ensure diverse talent pipelines**

# Career Opportunities



**Data analytics and machine learning are enabling us to predict failures before they occur, minimizing downtime, reducing O&M and lost revenue**

## Remote Operations and Data Analytics



- Where power generation and big data converge
- Single renewable control center
- Predictive modeling and early stage repairs through machine learning and data analytics
- Model-based control systems dynamically optimizing equipment to increase NCF

## Experienced technicians operate and maintain our 100+ wind sites in the United States and Canada.

- Experienced technicians on site
- On-going training and mentoring programs
- Supported by 24/7 fleet monitoring and diagnostic center



# A Day in the Life of a Wind Technician



# Central Maintenance Wind Field Service Technicians



**Due to the size of the portfolio, NEER has a unique opportunity for several cost saving initiatives**

## **Cranes and Bundling of Major Component Work**

- **Self-owned cranes and Liftra up-tower cranes to eliminate high third party crane costs**
- **Internal Major Component Experts**
- **Schedule work in bundles to significantly reduce crane transport and set-up cost**



# Blade replacement

# Some Assembly Required





# Solar 101

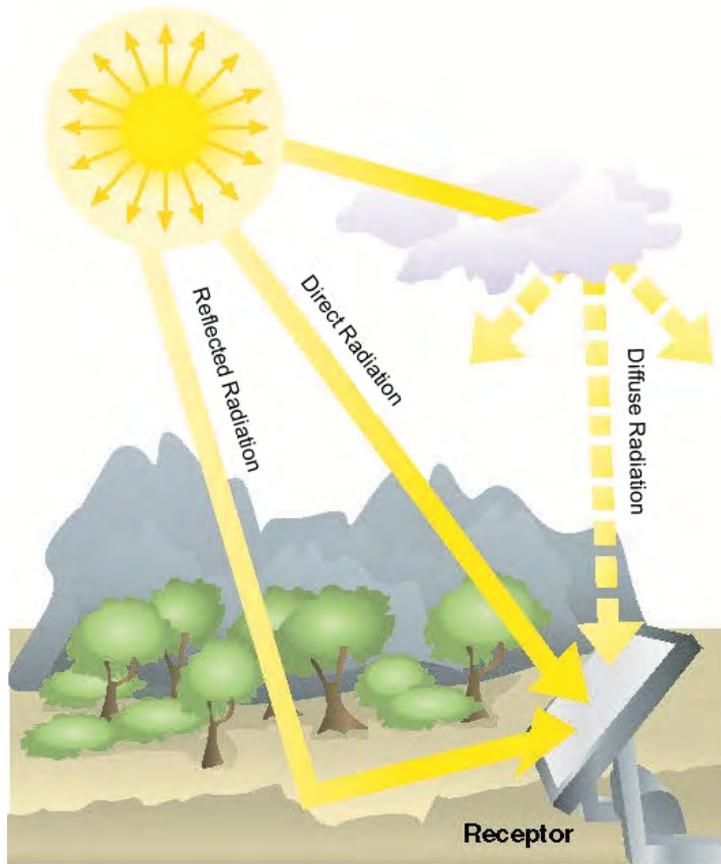
## Solar Technology: How a PV solar plant works



- As sunlight hits the solar panels, the photovoltaic energy is converted into direct current electricity (DC). The direct current flows from the panels through inverters and is converted into alternating current (AC)
- The electricity travels through transformers, and the voltage is stepped up to transmission level for delivery

The primary form of solar power uses photovoltaic panels to convert radiation into power

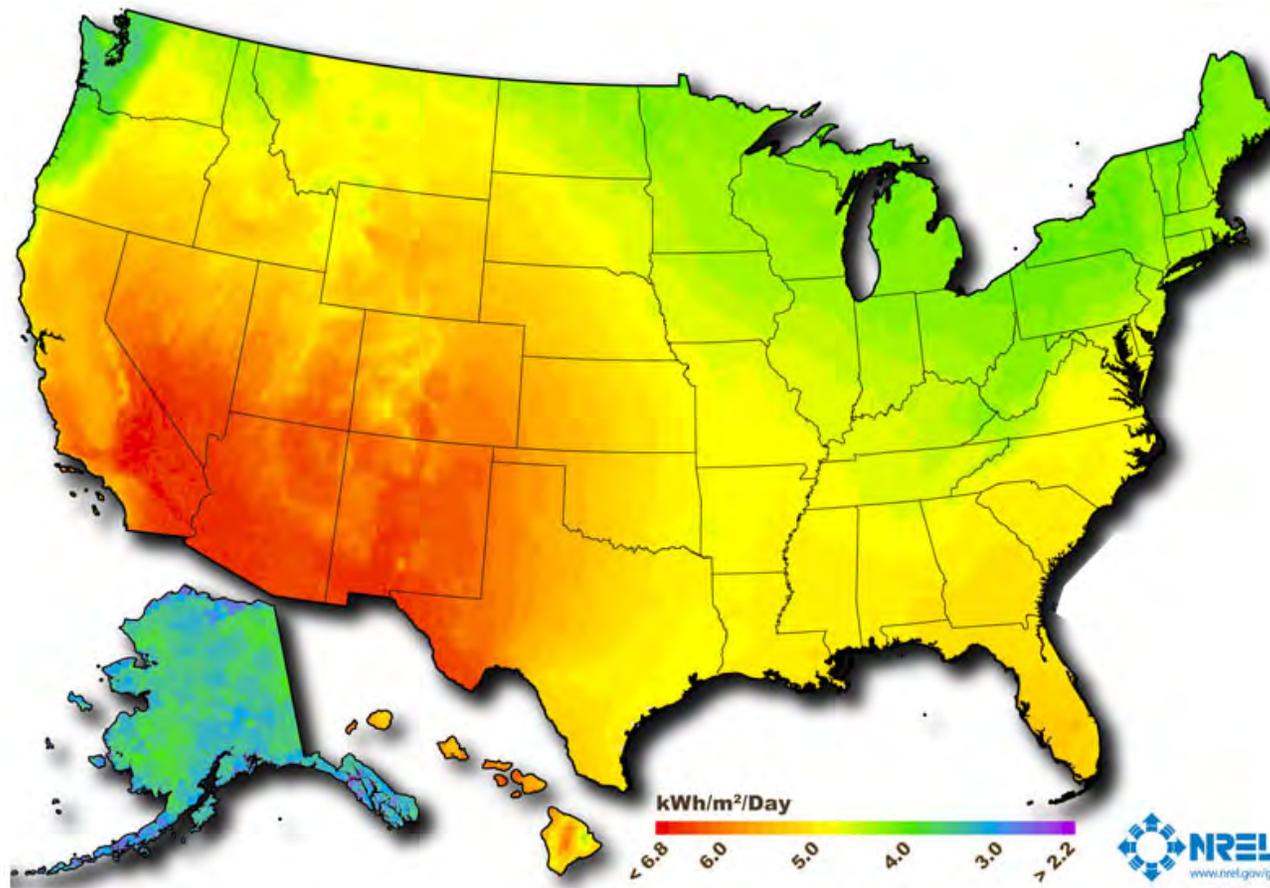
### Photovoltaic (PV) Solar Power



- Most common form of solar power
  - Uses photovoltaic panels to generate DC power
  - Large DC:AC inverters convert local (DC) power to grid (AC) power
  - This is the primary focus of NEER development and WindLogics evaluations
- 
- Direct Normal Irradiance (DNI)
  - Diffuse Horizontal Irradiance (DHI)
  - Global Horizontal Irradiance (GHI)

**Solar resource potential is greatest in the desert southwest, however solar PV plants can be viable throughout North America**

**North American Solar Resource**





# Thunder Wolf and Neptune Solar + Battery Storage

October 30, 2019



Local Investment. Jobs. Clean Energy.

# Job opportunities with NextEra can be found at [www.nexteraenergy.com/careers/](http://www.nexteraenergy.com/careers/)

The screenshot shows a web browser window with the URL <https://jobs.nexteraenergy.com/>. The browser's address bar and menu bar are visible. The website header features the NextEra Energy logo on the left and navigation links for Home, Featured Jobs, About Us, and Accommodations on the right. Below the header, there are links for Language and View Profile. The main content area is a collage of images related to renewable energy, including wind turbines, solar panels, a worker in a hard hat, a drone, and a control room. A central grey sign-up form is overlaid on the collage. The form contains the following text:

**NextEra Energy is the world's largest producer of renewable energy from the wind and sun.**

Join our Talent Community.

Enter your email and tell us a little about yourself. We'll keep you informed about upcoming events and opportunities at NextEra Energy that match your interests.

Email Address

[Sign Up Now](#)



**Photo By: Tyler Eubanks**

# Questions?

